



() Preliminary Specification
(V) Final Specification

Module	15" XGA TFT-LCD Module
Model Name	A150XN01 V.2

Customer	Date
Approved by	
Note: This Specification is subject to change without notice.	

Checked & Approved by	Date
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Record of Revision

Version and Date	Page	Old description	New Description
0.0 2008/07/18	All	First Draft	All
0.1 2008/08/22	5	Power consumption and Weight	Updated
	6	Chromaticity and Note 1	Updated
	9	IDD and PDD	Updated
	22~23	Outline Drawing	Updated
	24	Packing Form	Added
0.2 2008/12/01	5	LED 9.9W (Typ)	LED 13.125W (Typ)
	6	Chromaticity: Green	Updated
	8	4.2 Absolute Ratings of Backlight Unit	Updated
	9	Value of IDD/Irush/Pdd	Updated
	13,19	19 and 20 pin	Exchanged
	22~23	Outline drawing	Updated
	24	Packing Form	Updated
0.3 2009/01/23	5	White Luminance and LED power consumption	Updated
	6	Condition of Luminance and note 1	Updated
	8	LED input current	Updated
	10~11	5.1.2 table and note 2	Updated
	21	Condition of Mechanical shock	1 times for each direction
	24	Packing Form	Updated
0.4 2009/02/04	5	Optical response time: 8 ms	Optical response time: 12 ms
		Current condition of white luminance	500mA
	6	Optical response time	Updated
		LED condition	Updated
	7	Functional Block Diagram	Updated
	8	4.2 Absolute Ratings of Backlight Unit	Remove typ. value
			Add remark and Max. of ILED
0.5 2009/0727	9	IDD/Irush max.	Added
	25	Packing Form	Updated



1. Handling Precautions

- 1) Since front polarizer is easily damaged, pay attention not to scratch it.
- 2) Be sure to turn off power supply when inserting or disconnecting from input connector.
- 3) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- 4) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- 5) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface.
- 6) Since CMOS LSI is used in this module, take care of static electricity and insure human earth when handling.
- 7) Do not open or modify the Module Assembly.
- 8) At the insertion or removal of the Signal Interface Connector, be sure not to rotate nor tilt the Interface Connector of the TFT Module.
- 9) After installation of the TFT Module into an enclosure, do not twist nor bend the TFT Module even momentary. At designing the enclosure, it should be taken into consideration that no bending/twisting forces are applied to the TFT Module from outside. Otherwise the TFT Module may be damaged.

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2. General Description

This specification applies to the 15 inch Color TFT-LCD module A150XN01 V2

The display supports the XGA (1024(H) x 768(V)) screen format and 16.2M colors. All input signals are 1 Channel LVDS interface compatible.

2.1 Display Characteristics

The following items are characteristics summary on the table under 25 ℃ condition:

Items	Unit	Specifications
Active Area	[mm]	304.128 (H) x 228.096
Pixels H x V		1024 (RGB) x 768
Pixel Pitch	[mm]	0.297 (per one triad) x 0.297
Pixel Arrangement		R.G.B. Vertical Stripe
Display Mode		TN mode, Normally White
White Luminance	[cd/m2]	350 (Typ) (500 mA)
Contrast Ratio		700
Optical ResponseTime	[msec]	12 (Typ, on/off)
Nominal Input Voltage VDD	[Volt]	+3.3 (Typ)
Power Consumption (VDD line + LED line)	[Watt]	LED 10.5W (Typ) VDD 1.65W(Typ) , Black Pattern
Weight	[Grams]	970
Physical Size (H x V x D)	[mm]	326 (W) x 252(H) x 11.5(D) (Max)
Electrical Interface		one Channel LVDS
Surface Treatment		Anti-glare type, Hardness 3H
Support Colors		16.2M colors (RGB 6-bits+FRC)
RoHS Compliance		RoHS Compliance

2.2 Optical Characteristics

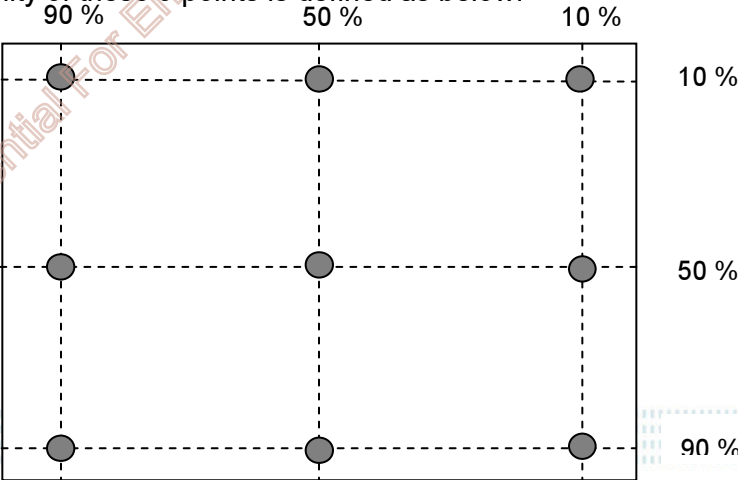
The optical characteristics are measured under stable conditions at 25℃ (Room Temperature).

Item	Unit	Conditions	Min.	Typ.	Max.	Note
Viewing Angle	[degree]	Horizontal (Right)	60	70	-	
		CR = 10 (Left)	60	70		
		Vertical (Up)	55	65	-	
		CR = 10 (Down)	50	60		
Luminance Uniformity	[%]	9 Points	70		-	2
Optical Response Time	[msec]	Rising	-	8	11	
		Falling	-	4	6	
		Rising + Falling	-	12	17	
Color / Chromaticity Coordinates (CIE 1931)		White x	0.26	0.31	0.36	1
		White y	0.28	0.33	0.38	
		Red x	0.59	0.64	0.69	
		Red y	0.29	0.34	0.39	
		Green x	0.27	0.32	0.37	
		Green y	0.55	0.60	0.65	
		Blue x	0.09	0.14	0.19	
		Blue y	0.01	0.06	0.11	
White Luminance (At LED=500mA)	[cd/m2]		300	350	-	1
Contrast Ratio			450	700	-	

Optical Equipment: BM-5A, BM-7, PR880, or equivalent

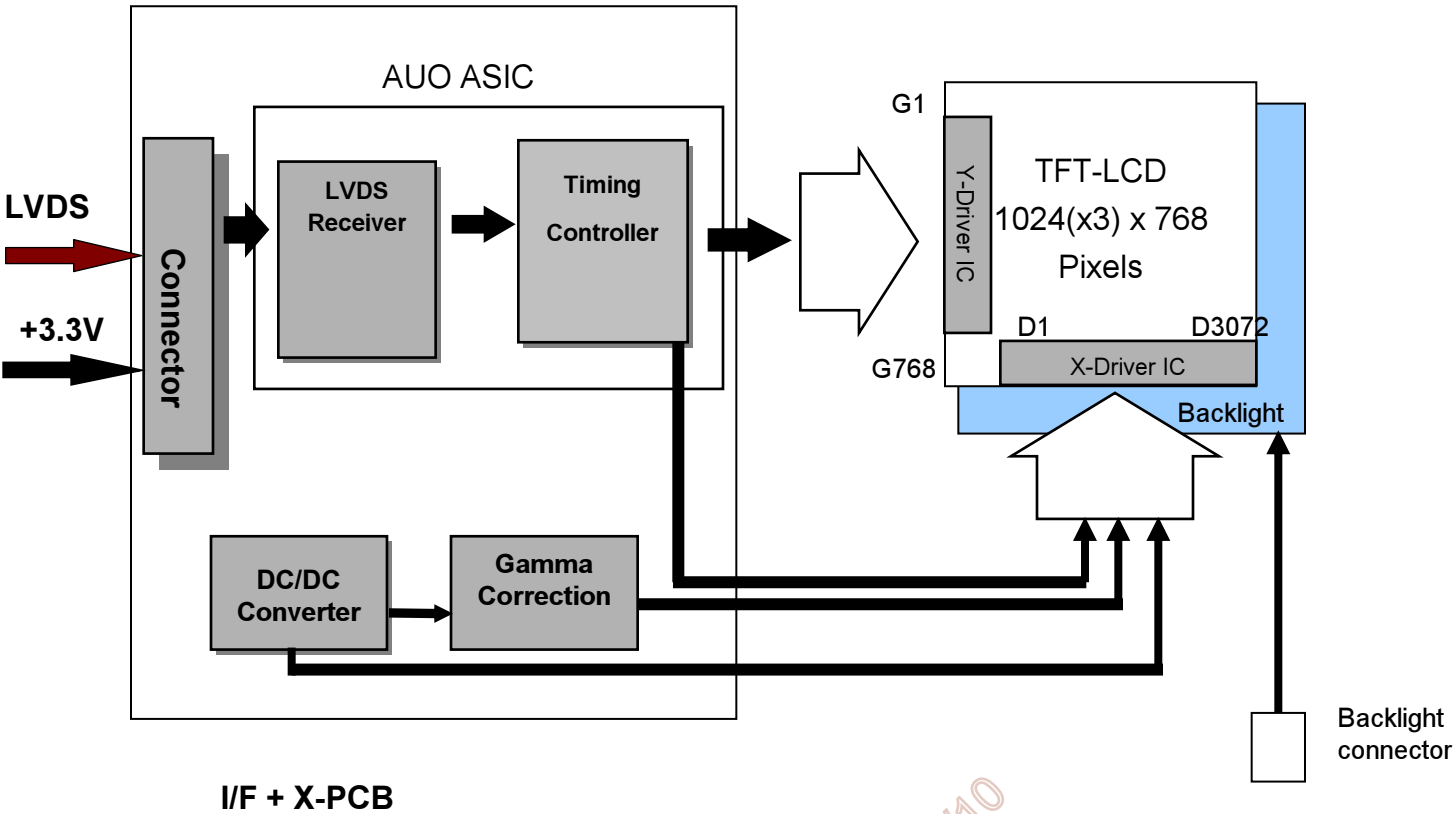
Note 1: Ambient temperature =25℃. And LED forward current $I_L = 500 \text{ mA}$. To be measured in the dark room below 10 Lux and to be measured on the center area of panel with a viewing cone of 1°by Topcon luminance meter BM-7, after 10 minute operation.

Note 2: Luminance Uniformity of these 9 points is defined as below:



3. Functional Block Diagram

The following diagram shows the functional block of the 15.0 inches wide Color TFT-LCD Module:



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4. Absolute Maximum Ratings

Absolute maximum ratings of the module are as follows:

4.1 Absolute Ratings of TFT LCD Module

Item	Symbol	Min.	Max.	Unit	Conditions
Logic/LCD Drive Voltage	VDD	-0.3	+4.0	[Volt]	

4.2 Absolute Ratings of Backlight Unit

Item	Symbol	Min.	Max.	Unit	Remark
VLED voltage input	VLED		24	V	
VLED current input	ILED		750	mA	
LED Life Time		10,000			Ambient temperature =25℃

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5. Electrical characteristics

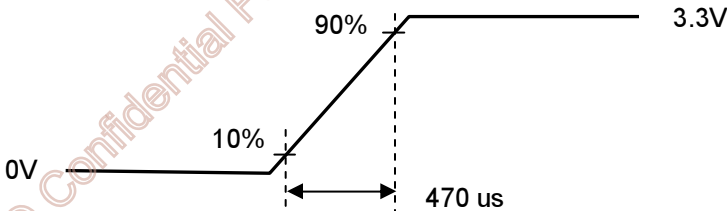
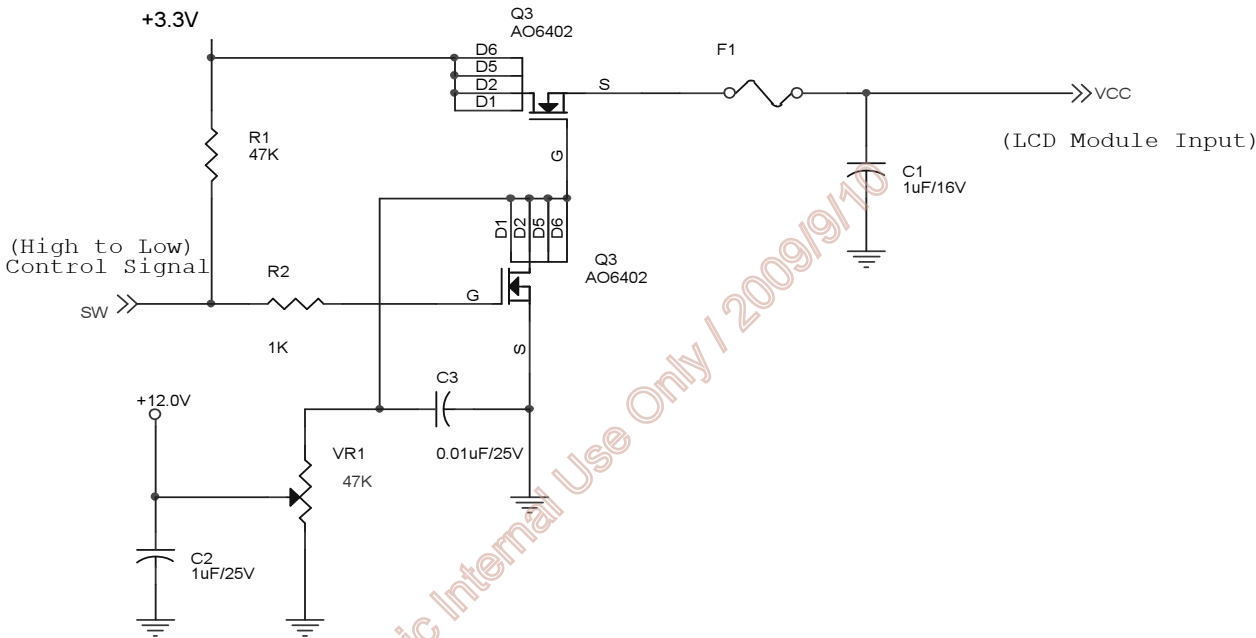
5.1 TFT LCD Module

5.1.1 Power Specification

Input power specifications are as follows:

Symble	Parameter	Min.	Typ.	Max.	Unit	Condition
VDD	Logic/LCD Drive Voltage	3.0	3.3	3.6	[Volt]	± 10%
IDD	VDD current	-	600	650	[mA]	Vin=3.3V , Black Pattern, at 60Hz
Irush	LCD Inrush Current	-	800	820	[mA]	Vin rising time = 470us
PDD	VDD Power		1.98	-	[Watt]	Vin=3.3V , Black Pattern, at 60Hz

Note: Measurement conditions:



Vin rising time

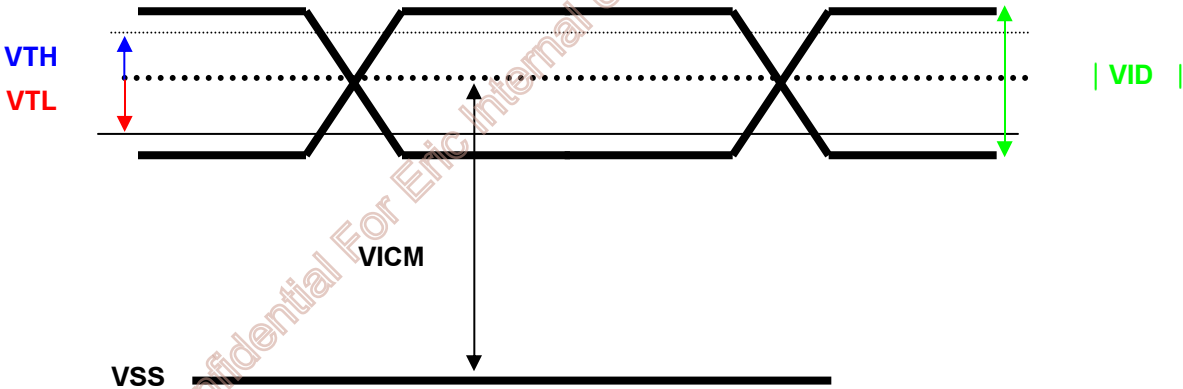
5.1.2 Signal Electrical Characteristics

Input signals shall be low or Hi-Z state when Vin is off
It is recommended to refer the specifications of SN75LVDS82DGG (Texas Instruments) in detail.

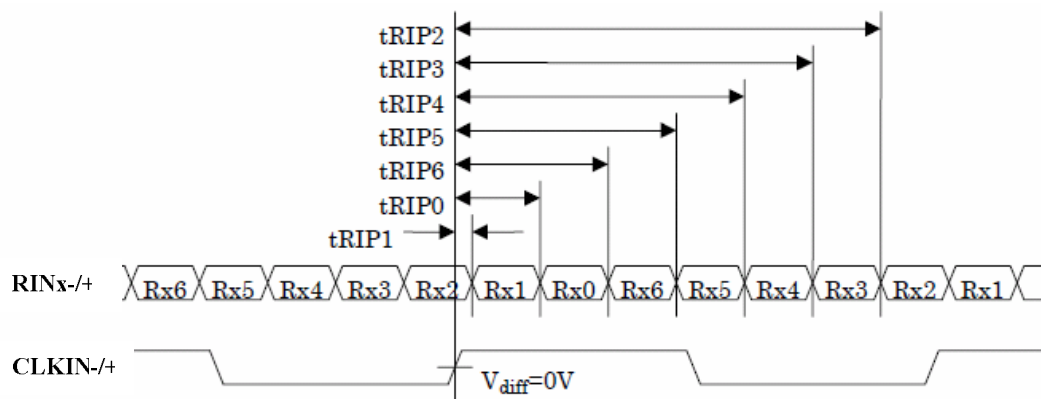
Each signal characteristics are as follows;

Symbol	Parameter	Min	Typ	Max	Units	Condition
VTH	Differential Input High Threshold	-	-	100	[mV]	VICM = 1.2V Note1
VTL	Differential Input Low Threshold	-100	-	-	[mV]	VICM = 1.2V Note1
VID	Input Differential Voltage	250	350	450	[mV]	Note1
VICM	Differential Input Common Mode Voltage	1.0	1.25	2	[V]	VTH/VTL = ± 100mV Note1
tRMG	CLKIN-/+ = 85MHz CLK IN-/+ = 65MHz	-0.4 -0.6	- -	0.4 0.6	ns	Receiver data input margin Note2
tRIP1	Input data position 0	tRMG	0.0	tRMG	ns	Note2
tRIP0	Input data position 1	T/7 - tRMG	T/7	T/7 + tRMG		
tRIP6	Input data position 2	2T/7 - tRMG	2T/7	2T/7 + tRMG		
tRIP5	Input data position 3	3T/7 - tRMG	3T/7	3T/7 + tRMG		
tRIP4	Input data position 4	4T/7 - tRMG	4T/7	4T/7 + tRMG		
tRIP3	Input data position 5	5T/7 - tRMG	5T/7	5T/7 + tRMG		
tRIP2	Input data position 6	6T/7 - tRMG	6T/7	6T/7 + tRMG		

Note1: LVDS Signal Waveform



Note2: LVDS Input Signal For Timing Specification



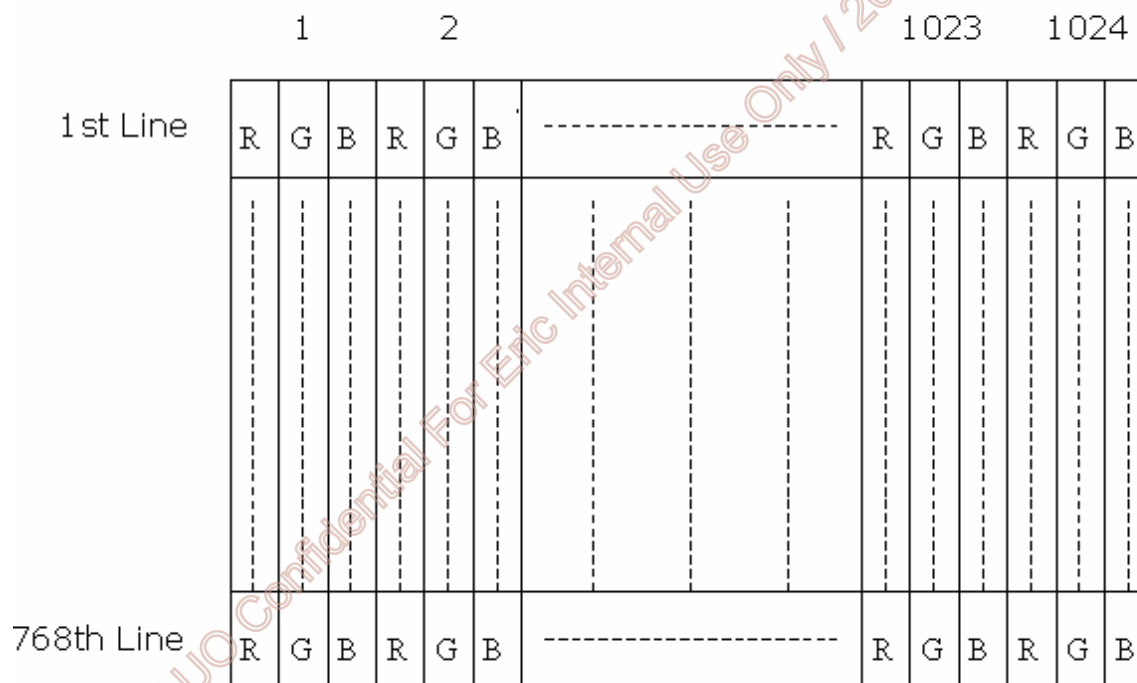
5.1.3 Backlight unit

Item	Symbol	Min.	Typ.	Max.	Unit
VLED voltage input	VLED		21	24	V
VLED current input	ILED		500	750	mA

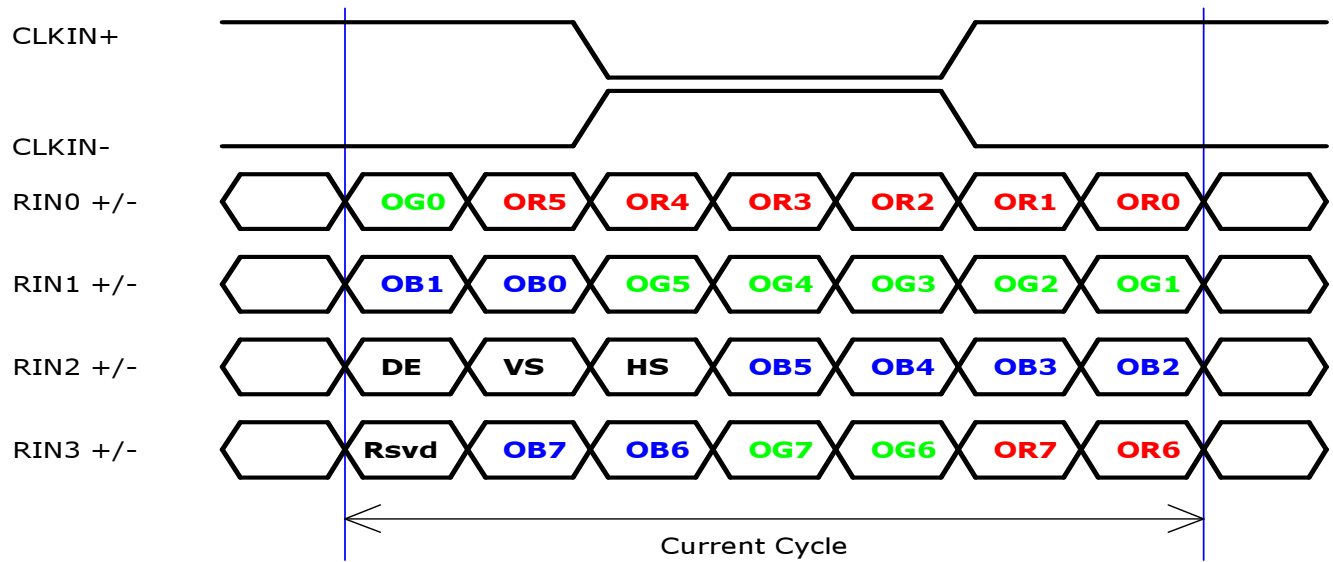
6. Signal Characteristic

6.1 Pixel Format Image

Following figure shows the relationship of the input signals and LCD pixel format.



6.2 The Input Data Format



Note1: Please follow PSWG.
Note2: 8-bit in
Note3: R/G/B data 7:MSB, R/G/B data 0:LSB

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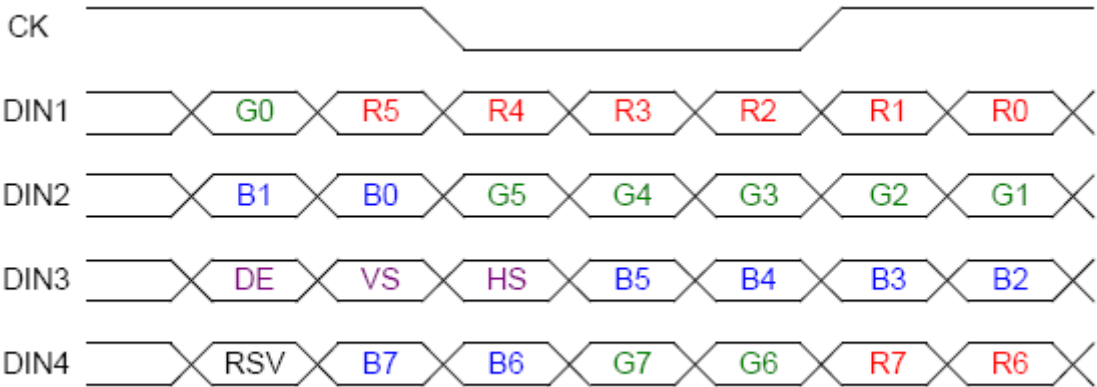
6.3 Signal Description

The module using a pair of LVDS receiver SN75LVDS82(Texas Instruments) or compatible. LVDS is a differential signal technology for LCD interface and high speed data transfer device. Transmitter shall be SN75LVDS83(negative edge sampling) or compatible. The first LVDS port(RxOxxx) transmits odd pixels while the second LVDS port(RxExxx) transmits even pixels.

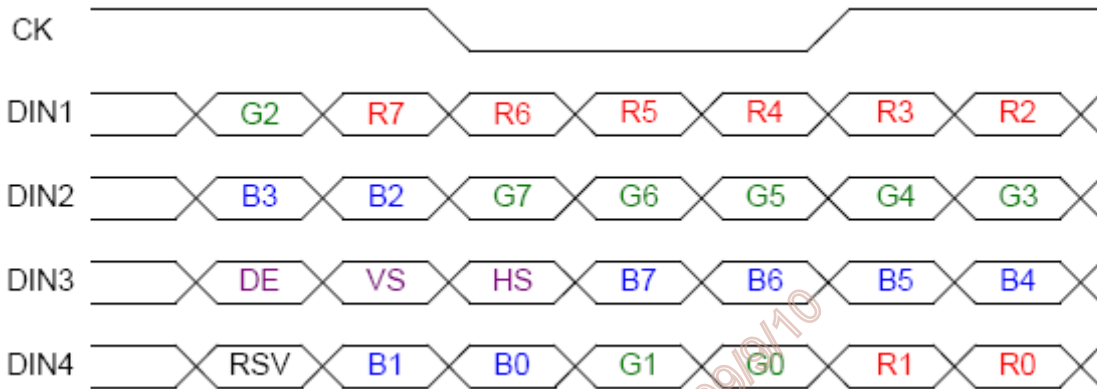
DF14H-20P-1.25H (HIROSE)		
Pin No.	Symbol	Description
1	VDD	Power Supply, 3.3V (typical)
2	VDD	Power Supply, 3.3V (typical)
3	VSS	Ground
4	VSS	Ground
5	Rin0-	- LVDS differential data input (R0-R5, G0)
6	Rin0+	+ LVDS differential data input (R0-R5, G0)
7	VSS	Ground
8	Rin1-	- LVDS differential data input (G1-G5, B0-B1)
9	Rin1+	+ LVDS differential data input (G1-G5, B0-B1)
10	VSS	Ground
11	Rin2-	- LVDS differential data input (B2-B5, HS, VS, DE)
12	Rin2+	+ LVDS differential data input (B2-B5, HS, VS, DE)
13	VSS	Ground
14	ClkIN-	- LVDS differential clock input
15	ClkIN+	+ LVDS differential clock input
16	VSS	Ground
17	Rin3-	- LVDS differential data input (R6-R7, G6-G7,B6-B7)
18	Rin3+	- LVDS differential data input (R6-R7, G6-G7,B6-B7)
19	RL/UD	H: 180 degree rotation L: Normal mode
20	SEL LVDS	H: NS alike L: Thine alike

(Note 1)

Note 1 :



(a) NS alike



(b)Thine alike



6.4 Interface Timing

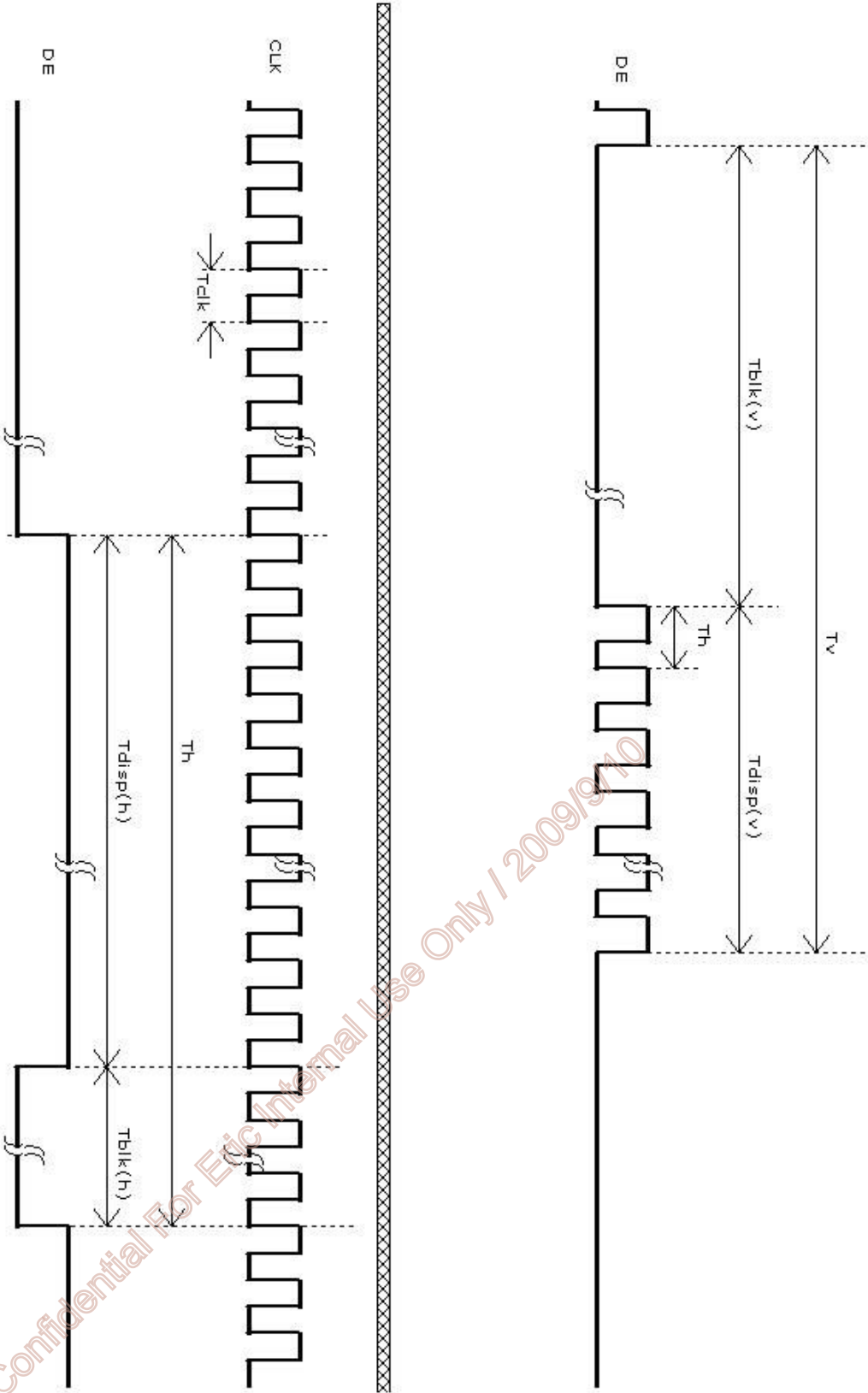
6.4.1 Timing Characteristics

Signal	Item	Symbol	Min	Typ	Max	Unit
Clock Timing	Clock frequency	Tclk	50	65	81	MHz
Hsync Timing	Horizontal active	Tdisp(h)	1024	1024	1024	Tclk
	Horizontal blanking	Tblk(h)	30	320	1024	Tclk
	Horizontal period	Th	1054	1344	2048	Tck
Vsync Timing	Vertical active	Tdisp(v)	768	768	768	Th
	Vertical blanking	Tblk(v)	8	38	256	Th
	Vertical period	Tv	776	806	1024	Th

Note: DE mode only
Note: Typical value refer to VESA STANDARD

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6.4.2 Timing Diagram





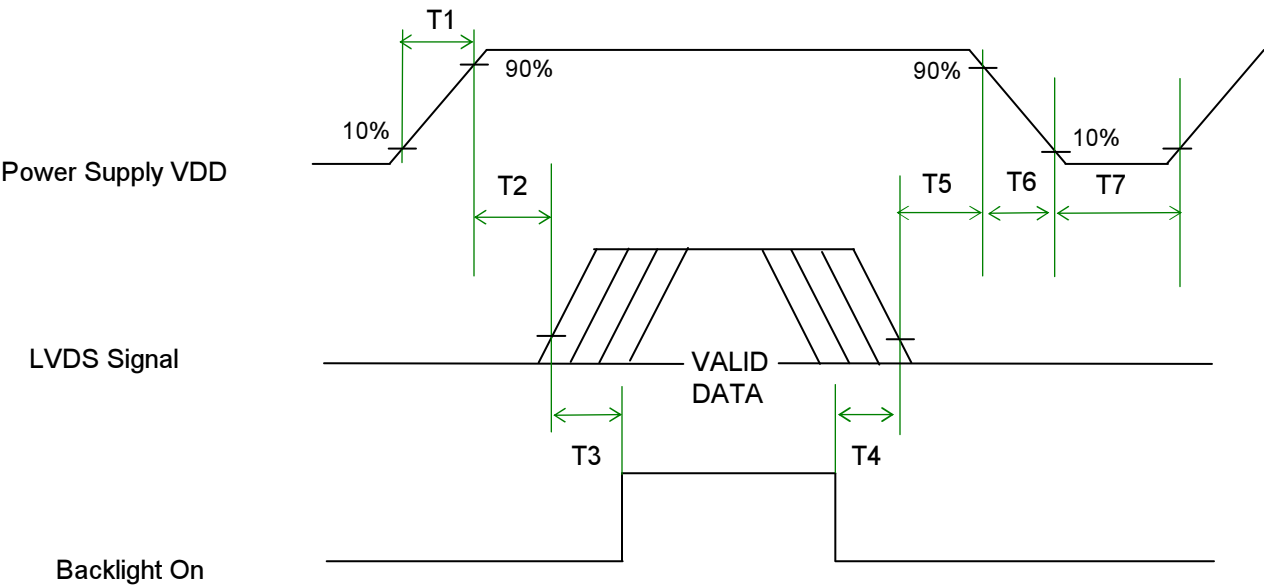
6.5 Color Input Data Reference

Color Data Reference

Color		Input Color Data																									
		RED								GREEN								BLUE									
		R7 (M)	R6	R5	R4	R3	R2	R1	R0 (L)	R7 (M)	R6	R5	R4	R3	R2	R1	R0 (L)	R7 (M)	R6	R5	R4	R3	R2	R1	R0 (L)		
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
RED	RED (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	—																										
	RED (254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED (255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GREEN	GREEN (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	—																										
	GREEN (254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	GREEN (255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
BLUE	BLUE (000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE (001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
	—																										
	BLUE (254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0
	BLUE (255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

6.6 Power ON/OFF Sequence

Vin power and lamp on/off sequence is as follows. Interface signals are also shown in the chart. Signals from any system shall be Hi-Z state or low level when Vin is off.



Power Sequence Timing

Parameter	Value			Unit
	Min.	Typ.	Max.	
T1	0.5	-	10	[ms]
T2	30	40	50	[ms]
T3	200	-	-	[ms]
T4	100	-	-	[ms]
T5	0	16	50	[ms]
T6	-	-	10	[ms]
T7	1000	-	-	[ms]



7. Connector & Pin Assignment

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.1 TFT LCD Module

7.1.1 Connector

Connector Name / Designation	Interface Connector / Interface card
Manufacturer	HIROSE
Type Part Number	HRS DF14H-20P-1.25H (56)

7.1.2 Pin Assignment

Pin#	Signal Name	Pin#	Signal Name
1	VDD	2	VDD
3	VSS	4	VSS
5	Rin0-	6	Rin0+
7	VSS	8	Rin1-
9	Rin1+	10	VSS
11	Rin2-	12	Rin2+
13	VSS	14	CIkIN-
15	CIkIN+	16	VSS
17	Rin3-	18	Rin3+
19	RL/UD	20	SEL LVDS



7.2 Backlight Unit

Physical interface is described as for the connector on module. These connectors are capable of accommodating the following signals and will be following components.

7.2.1 Connector

Connector Name / Designation	Lightbar Connector / Backlight Lightbar
Manufacturer	JST
Type Part Number	PHR-2

7.2.2 Pin Assignment

Pin#	Signal Name	Pin #	Signal Name
1	Power	2	GND

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8. Reliability Test

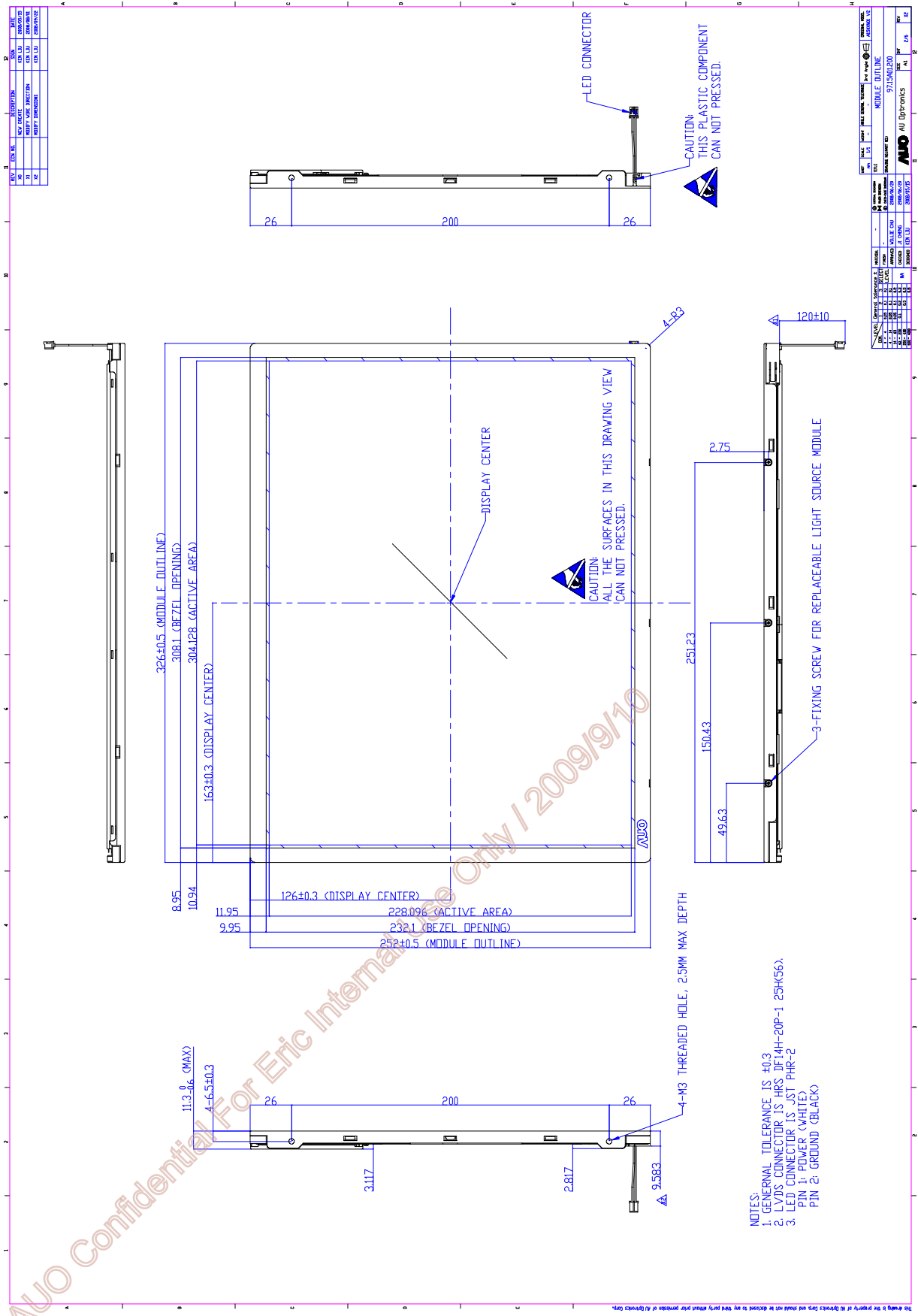
Environment test conditions are listed as following table.

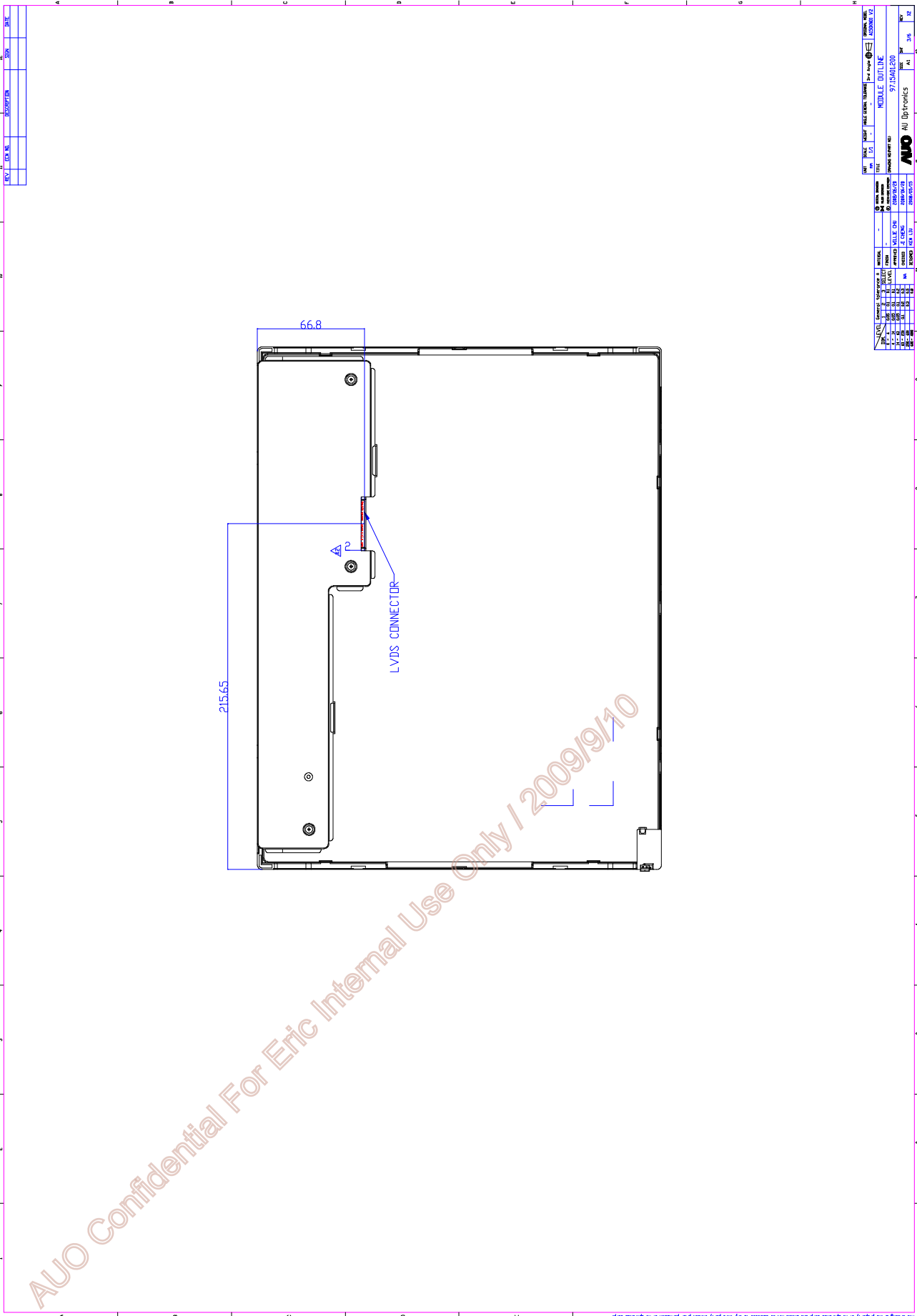
No.	Test items	Conditions	Remark
1	High temperature storage	Ta= 70℃ 240Hrs	
2	Low temperature storage	Ta= -20℃ 240Hrs	
3	High temperature operation	Tp= 70℃ 240Hrs	
4	Low temperature operation	Ta= 0℃ 240Hrs	
5	High temperature and high humidity	Tp= 50℃, 80% RH 240Hrs	Operation
6	Thermal shock	-20℃ to +60℃, Ramp ≤20℃/min, Duration at Temp. = 30min, Test Cycles = 50	Non-operation
7	Vibration	Frequency range : 8~33.3Hz Stoke : 1.3mm Sweep : 3.0G, 33.3 ~ 400Hz Cycle : 15 minutes 2 hours for each direction of X,Z 4 hours for Y direction	JIS D1601, A-10 Condition A
8	Mechanical shock	100G, 6ms, ±X,±Y,±Z 1 times for each direction	JIS C0041, A-7 Condition C
9	Vibration (with carton)	Random vibration: 0.015G ² /Hz from 5~200Hz -6dB/octave from 200~500Hz	IEC 68-34
10	Drop (with carton)	Height: 60cm 1 corner, 3 edges, 6 surfaces	JIS Z0202
11	Electro Static discharge (ESD)	Contact Discharge: ±8KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point. Air Discharge: ± 15KV, 150pF(330Ω) 1sec, 8 points, 25 times/ point.	Operation & Non-operation

Note 1: The TFT-LCD module will not sustain damage after being subjected to 100 cycles of rapid temperature change. A cycle of rapid temperature change consists of varying the temperature from -10℃ to 80℃, and back again. Power is not applied during the test. After temperature cycling, the unit is placed in normal room ambient for at least 4 hours before power on.

Note 2: According to EN61000-4-2 , ESD class B: Some performance degradation allowed. No data lost. Self-recoverable. No hardware failures.

9. Outline Drawing

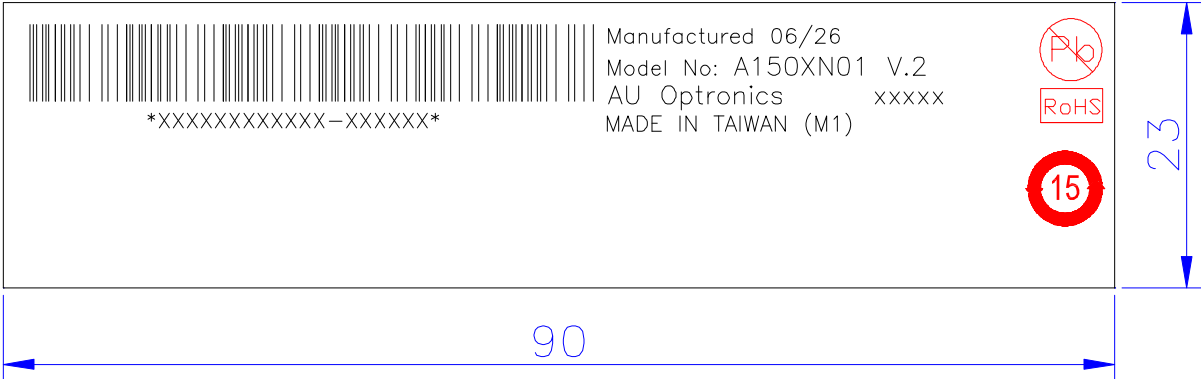




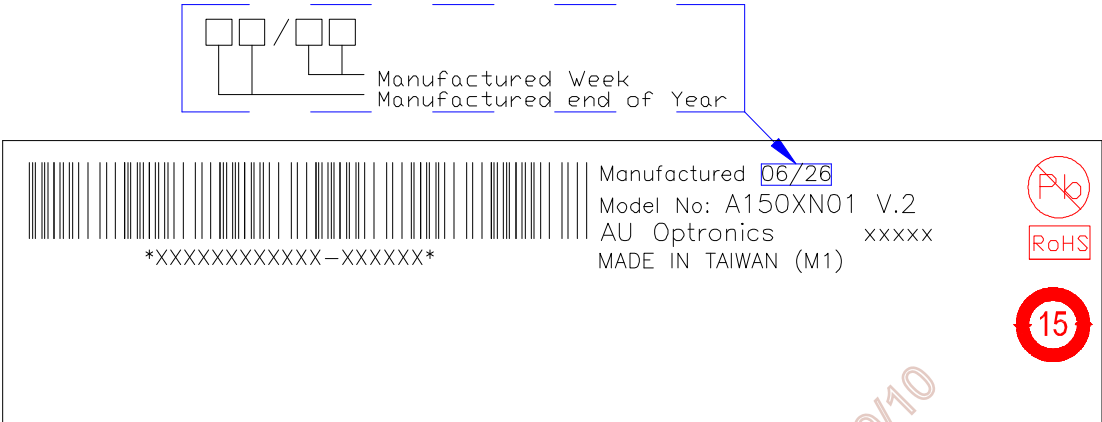
10. Lot definition

10.1 Lot definition of product (Product Label)

10.1.1 Example lot number



10.1.2 Manufactured end of year and week mark



a. Manufactured end of year mark

Mark	05	06	07	08	...
Definition	2005	2006	2007	2008	...

b. Manufactured week mark

Mark	01	02	...
Definition	1st Week	2nd Week	...

10.2 Lot definition of part (BLU Label)

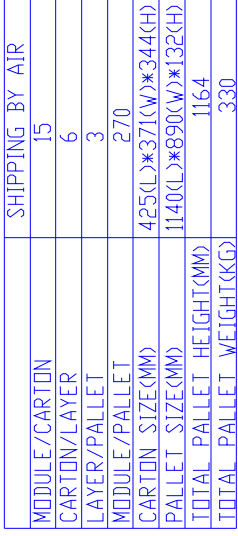
10.1.1 Example lot number





AU OPTRONICS CORPORATION

11. Packing Form

document version 0.5

25/25